



U.S. NUCLEAR REGULATORY COMMISSION  
**STANDARD REVIEW PLAN**  
OFFICE OF NUCLEAR REACTOR REGULATION

#### 4.5.2 REACTOR INTERNAL AND CORE SUPPORT MATERIALS

##### REVIEW RESPONSIBILITIES

Primary - ~~Materials Engineering Branch (MTEB)~~ Materials and Chemical Engineering Branch (EMCB)<sup>1</sup>

Secondary - None

##### I. AREAS OF REVIEW

Section 50.55a, "Codes and Standards," and General Design Criterion 1, Appendix A, 10 CFR Part 50 requires that structures, systems, and components (SSCs)<sup>2</sup> important to safety shall be designed, fabricated, and tested to quality standards commensurate with the importance of the safety function to be performed. The purpose of this SRP section is to review and evaluate the adequacy of the materials selected for the construction of the reactor internals and core support structures, and to assure that these regulations are met for those structures and components.<sup>3</sup> The reactor internals and core support structures reviewed under this SRP section include all structures and components within the pressure vessel other than the fuel and control assemblies, and instrumentation.<sup>4</sup>

The ~~Materials Engineering Branch (MTEB)~~EMCB<sup>5</sup> reviews the materials specifications,<sup>6</sup> component design, fabrication and inspection to assure structural integrity in compliance with Section 50.55a and General Design Criterion 1 of 10 CFR Part 50. ~~The Chemical Engineering Branch (CMEB)~~ reviews areas of corrosion and compatibility of these materials with the expected environment during service as part of its primary review responsibility of SRP Section 5.2.3.<sup>7</sup>

DRAFT Rev. 3 - April 1996

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#### USNRC STANDARD REVIEW PLAN

Standard review plans are prepared for the guidance of the Office of Nuclear Reactor Regulation staff responsible for the review of applications to construct and operate nuclear power plants. These documents are made available to the public as part of the Commission's policy to inform the nuclear industry and the general public of regulatory procedures and policies. Standard review plans are not substitutes for regulatory guides or the Commission's regulations and compliance with them is not required. The standard review plan sections are keyed to the Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants. Not all sections of the Standard Format have a corresponding review plan.

Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.

Comments and suggestions for improvement will be considered and should be sent to the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, D.C. 20555.

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The following areas in the applicant's safety analysis report (SAR) relating to reactor internal and core support materials are reviewed:

1. Material Specifications

The review includes the specifications for the materials, including weld materials, to be used for ~~major components of the reactor internals which consist of and the core support structures and the internal structures.~~<sup>8</sup> ~~The reactor internal and core support structures are all structures and components within the pressure vessel other than the fuel and control assemblies, and instrumentation.~~<sup>9</sup>

The adequacy and suitability of the materials specified for the above applications are reviewed in terms of their mechanical properties, stress corrosion resistance, and fabricability.

2. Controls on Welding

The review includes the controls on welding ~~of materials used for reactor internals and core support structures.~~<sup>10</sup>

3. Nondestructive Examination of Wrought Seamless Tubular Products and Fittings<sup>11</sup>

The review includes information submitted by the applicant on the nondestructive examinations<sup>12</sup> procedures used for inspection of each product form.

4. Austenitic Stainless Steel

Austenitic stainless steels ~~is~~<sup>13</sup> primarily used for the construction of the reactor internals and core support structures.<sup>14</sup> These steels may be used in a variety of product forms including several stabilized product forms. Unstabilized austenitic stainless steels, such as Types 304 and 316, ~~is normally~~<sup>15</sup> are frequently specified.

Since ~~these~~<sup>16</sup> unstabilized compositions are susceptible to stress corrosion cracking when exposed to certain environmental conditions, process controls must be exercised during all stages of component manufacturing and reactor construction to avoid sensitization of the material, and to minimize exposure of the stainless steel to contaminants that lead to stress-corrosion cracking. The review includes information submitted by the applicant in these areas, as described in SRP Section 5.2.3, "Reactor Coolant Pressure Boundary Materials."

5. Other Materials

Materials other than austenitic stainless steels are reviewed and evaluated in terms of their mechanical properties, corrosion resistance, and fabricability.

## Review Interfaces<sup>17</sup>

EMCB also performs the following related reviews under the SRP Sections indicated:

1. Evaluates the adequacy of programs for assuring the integrity of bolting and threaded fasteners as part of its primary review responsibility for SRP Section 3.13 (proposed).<sup>18</sup>
2. ~~The Chemical Engineering Branch (CMEB) reviews~~ Evaluates the areas of corrosion and compatibility of ~~these~~ reactor internals and core support structures materials with the expected environment during service as part of its primary review responsibility of SRP Section 5.2.3.<sup>19</sup>
3. Determines the acceptability of the reactor coolant chemistry and associated chemistry controls (including additives such as inhibitors) as it relates to corrosion control and compatibility with materials to be exposed to reactor coolant, as part of its primary review responsibility for SRP Sections 5.4.8 "Reactor Water Cleanup System (BWR)" and 9.3.4 "Chemical and Volume Control System (PWR)."<sup>20</sup>

In addition, EMCB will coordinate other branches' evaluations that interface with the overall review of the reactor internals and core support structures as follows:<sup>21</sup>

1. The Mechanical Engineering Branch (EMEB) determines the adequacy of design fatigue curves for reactor internals and core support structures materials with respect to cumulative reactor service-related environmental and usage factor effects and consideration of each combination of loadings, as part of its primary review responsibilities for SRP Sections 3.9.1 and 3.9.3.<sup>22</sup>
2. The EMEB also reviews the reactor internals and core support structures with respect to their mechanical design adequacy to withstand design and service loading combinations, as part of its primary responsibility for SRP Section 3.9.5.<sup>23</sup>
3. The Emergency Preparedness and Radiation Protection Branch (PERB) evaluates the plant design, including the selection of materials to minimize activation products, to verify that occupational radiation exposures will be as low as is reasonably achievable (ALARA), as part of its primary review responsibility for SRP Section 12.1.<sup>24</sup>

For those areas of review identified above as part of the review under other SRP sections, the acceptance criteria necessary for the review and their methods of application are contained in the referenced SRP sections.<sup>25</sup>

## II. ACCEPTANCE CRITERIA

The design, fabrication, and testing of the materials used in the reactor internals and core support structures are reviewed and evaluated to meet codes and standards commensurate with the safety functions<sup>26</sup> to be performed so that the relevant requirements of Section 50.55a and General

Design Criteria 1 are met. The specific acceptance criteria necessary to meet these relevant requirements are as follows:

1. Material Specifications

For core support structures and reactor internals structures,<sup>27</sup> the permitted material specifications are those given in the ASME Boiler and Pressure Vessel Code (Reference 6, hereafter "the Code")<sup>28</sup>, Section III, Division 1<sup>29</sup>, NG-2000. These materials are described in detail in Parts A, B, and C of Section II of the Code.

Additional permitted materials and their applications are those shown identified in ASME Code Cases approved for use by as described in Regulatory Guide 1.85, "~~Code Case Acceptability, ASME Section III Materials.~~"<sup>30</sup>

2. Controls on Welding

~~The welds of components for Methods and controls for core support structures and reactor internals welds are~~ must be fabricated in accordance with the Code, Section III, Division 1<sup>31</sup>, NG-4000, and the welds must meet the examination and meet acceptance criteria shown as specified in NG-5000.<sup>32</sup>

3. Nondestructive Examination of Wrought Seamless Tubular Products and Fittings<sup>33</sup>

Examination shall be in accordance with the requirements of ASME Code,<sup>34</sup> Section III, Division 1<sup>35</sup>, NG-2500.

The acceptance criteria shall be in accordance with the requirements of ASME Code, Section III,<sup>36</sup> Division 1<sup>37</sup>, NG-5300.

4. Austenitic Stainless Steels

The acceptance criteria for this area of review are given in SRP Section 5.2.3, "~~Reactor Coolant Pressure Boundary Materials.~~" subsections II.2 and II.4.a, b, d, and e.<sup>38</sup>

Regulatory Guide 1.44, "~~Control of the Use of Sensitized Stainless Steel,~~"<sup>39</sup> describes acceptance criteria for preventing intergranular corrosion of stainless steel components. Furnace sensitized material should not be allowed, and methods described in this guide should be followed for cleaning and protecting austenitic stainless steel from contamination during handling, storage, testing, and fabrication, and for determining the degree of sensitization that occurs during welding. Regulatory Guide 1.31, "~~Control of Ferrite Content in Stainless Steel Weld Metal,~~"<sup>40</sup> describes acceptable criteria for assuring the integrity of welds in stainless steel components.

## 5. Other Materials

All materials used for reactor internals and core support structures<sup>41</sup> must be selected for their compatibility with the reactor coolant, as described in Subarticles NG-2160 and NG-3120 of Section III, Division 1<sup>42</sup> of the Code. The tempering temperature of martensitic stainless steels and the aging temperature of precipitation-hardened stainless steels should be specified to provide assurance that these materials will not deteriorate in service. Acceptable heat treatment temperatures are aging at 565°C - 595°C (1050°F - 1100°F)<sup>43</sup> for Type 17-4 PH and tempering at 565°C (1050°F),<sup>44</sup> for Type 410 stainless steel.

Other materials shall have similar appropriate heat treat and fabrication controls in accordance with strength and compatibility requirements.

### Technical Rationale<sup>45</sup>

The technical rationale for application of the above acceptance criteria to the reactor internals and core support structures materials is discussed in the following paragraph:

GDC 1 and 10 CFR 50.55a require that structures, systems, and components (SSCs) be designed, fabricated, erected, constructed, tested, and inspected to quality standards commensurate with the importance of the safety function to be performed. 10 CFR 50.55a also incorporates by reference the applicable editions and addenda of the ASME Boiler and Pressure Vessel Code. The reactor internals and core support structures include SSCs that perform safety functions and/or whose failure could affect the performance of safety functions by other SSCs. These safety functions include reactivity monitoring and control, core cooling, and fission product confinement (within both the fuel cladding and the primary reactor coolant system). Application of 10 CFR 50.55a and GDC 1 to the materials of construction provides assurance that established standard practices of proven or demonstrated effectiveness for selecting materials, fabrication, and testing/inspection of SSCs are used to achieve a high likelihood that these safety functions will be performed.

## III. REVIEW PROCEDURES

The reviewer will select and emphasize material from the procedures described below, as may be appropriate for a particular case.

For the areas of review described in subsection I of this SRP section, the review procedures ~~is~~ are as follows:<sup>46</sup>

### 1. Material Specifications

The list of the materials of construction ~~of the components of~~ for the reactor internals that are exposed to the reactor coolant is reviewed.<sup>47</sup>

The material specifications for each component or part used in the reactor internals and core support structures are compared with the acceptable specifications listed in the Code, Sections II and III, and/or acceptable Code Cases identified in Regulatory Guide 1.85 as shown described in the acceptance criteria.<sup>48</sup> Any exceptions to the Code materials specifications are clearly identified. The reviewer evaluates the basis for the exceptions, taking into account precedents set in earlier cases, and determines the acceptability of such materials.

2. Controls on Welding

The information submitted by the applicant is reviewed to provide assurance that welding methods and controls applied of materials used for components of the reactor internals and core support structures is<sup>49</sup> in accordance with the procedures of the Code, Section III, Division 1<sup>50</sup>, NG-4000. The controls on welding; discussed in SRP Section 5.2.3; are also considered applicable to welding of reactor internals, and information in this area is conformance with these welding controls is verified.<sup>51</sup> The reviewer assures that any special welding processes or welding controls conforms to the qualification requirements of the Code, Section IX, or that justification is made for any deviation.<sup>52</sup>

3. Nondestructive Examination of Wrought Seamless Tubular Products<sup>53</sup>

The information submitted by the applicant is reviewed to determine methods used for nondestructive examination. The Code, Section III, Division 1,<sup>54</sup> NG-2500 specifies that examination by either radiographic or ultrasonic examination is acceptable.

4. Austenitic Stainless Steel

The materials and fabrication procedures used for reactor internals are reviewed. The areas of review and review procedures follow include those spelled out described<sup>55</sup> in SRP Section 5.2.3, "Reactor Coolant Pressure Boundary Materials."<sup>56</sup> Environmental conditions must be controlled and welding procedures must be such that the probability of sensitization and microfissuring is reduced. With respect to verification of the degree of sensitization that occurs during welding, SRP Section 4.5.1, subsection III.2 identifies an acceptable alternate method to the methods described in Regulatory Guide 1.44.<sup>57</sup> In addition, the reviewer verifies that the material and reactor coolant compositions have been selected to assure compatibility, and that the fabrication and cleaning controls imposed on stainless steel components are designed to prevent contamination with chloride and fluoride ions.

5. Other Materials

The material specifications and fabrication procedures are reviewed to verify that the heat treatment and welding controls are appropriate for the material. The reviewer verifies that the fabrication and cleaning controls will preclude contamination of nickel base alloys by chloride ions, fluoride ions, or lead.

Operating experience has indicated that certain nickel-chromium-iron alloys (e.g. Inconel) are susceptible to cracking due to corrosion. Inconel 690 alloy has improved corrosion resistance in comparison to Inconel alloy 600 previously used in reactor applications. Where nickel-chromium-iron alloys are proposed for use, the reviewer verifies that an acceptable technical basis is either identified (based upon demonstrated satisfactory use in similar applications) or presented by the applicant to support use of the material. Particular review emphasis is placed upon the corrosion resistance and stress corrosion cracking resistance properties of the proposed nickel-chromium-iron alloy(s).<sup>58</sup>

#### 6. Additional Information Request

If the information contained in the SAR does not comply with the appropriate acceptance criteria, or if the information provided is inadequate to establish such compliance, the reviewer prepares a request for additional information for transmittal to Project Management. Such requests not only identify the additional information required, but also specify the changes needed in the SAR or the plant Technical Specifications to meet acceptance criteria. Subsequent amendments received in response to these requests are reviewed for compliance with the acceptance criteria.

For standard design certification reviews under 10 CFR Part 52, the procedures above should be followed, as modified by the procedures in SRP Section 14.3 (proposed), to verify that the design set forth in the standard safety analysis report, including inspections, tests, analysis, and acceptance criteria (ITAAC), site interface requirements and combined license action items, meet the acceptance criteria given in subsection II. SRP Section 14.3 (proposed) contains procedures for the review of certified design material (CDM) for the standard design, including the site parameters, interface criteria, and ITAAC.<sup>59</sup>

#### IV. EVALUATION FINDINGS

The reviewer verifies that sufficient and adequate information has been provided to satisfy the requirements of the SRP section, and that ~~his~~<sup>the</sup><sup>60</sup> evaluation supports conclusions of the following type, to be included in the staff's safety evaluation report:

The staff concludes that the materials used for the construction of the reactor internals and core support structures<sup>61</sup> are acceptable and meet the requirements of General Design Criterion 1 and Section 50.55a of 10 CFR Part 50. This conclusion is based upon the following considerations:

~~The applicant has met the requirements of GDC 1 and Section 50.55a of 10 CFR Part 50 with respect to assuring~~ provided assurance<sup>62</sup> that the design, fabrication, and testing of the materials used in the reactor internals and core support structures<sup>63</sup> are of high quality standards and are adequate ~~for~~ to assure structural integrity.<sup>64</sup> The controls imposed upon components constructed of austenitic stainless steel satisfy the ~~recommendations~~ positions<sup>65</sup> of Regulatory Guide 1.31, "Control of Ferrite Content in Stainless Steel Weld Metal," and Regulatory Guide 1.44, "Control of the Use of Sensitized Stainless Steel," and the related criteria described in SRP Section 5.2.3, "Reactor Coolant Pressure Boundary Materials."<sup>66</sup>

The materials used for construction of components of the reactor internals and core support structures<sup>67</sup> have been identified by specification and found to be in conformance with the requirements of NG-2000 of Section III, Division 1<sup>68</sup> and Parts A, B, and C of Section II of the ASME Code. ~~In addition, the applicant has met the guidelines of Regulatory Guide 1.85 by using materials of construction that are approved for use by ASME Code cases.~~ For materials not in accordance with ASME Code provisions, the applicant has selected materials of construction that are approved for use in the acceptable ASME Code Cases described in Regulatory Guide 1.85 or that have otherwise been demonstrated acceptable for the application.<sup>69</sup> As proven by extensive tests and satisfactory performance, the specified materials are compatible with the expected environment and corrosion is expected to be negligible.

The controls imposed on the reactor coolant chemistry provide reasonable assurance that the reactor internals and core support structures<sup>70</sup> will be adequately protected during operation from conditions which could lead to stress corrosion of the materials and loss of component structural integrity.

The material selection, fabrication practices, examination and testing procedures, and control practices ~~performed in accordance to these recommendations~~ provide reasonable assurance that the materials used for the reactor internals and core support structures<sup>71</sup> will be in a metallurgical condition to preclude inservice deterioration.

Conformance with requirements of the ASME Code and the recommendations of the regulatory guides<sup>72</sup> constitutes an acceptable basis for meeting ~~in part~~ the relevant requirements of General Design Criterion 1 and Section 50.55a of 10 CFR Part 50.<sup>73</sup>

For design certification reviews, the findings will also summarize, to the extent that the review is not discussed in other safety evaluation report sections, the staff's evaluation of inspections, tests, analyses, and acceptance criteria (ITAAC), including design acceptance criteria (DAC), site interface requirements, and combined license action items that are relevant to this SRP section.<sup>74</sup>

## V. IMPLEMENTATION

The following is intended to provide guidance to applicants and licensees regarding the staff's plan for implementing this section of the Standard Review Plan.

This SRP section will be used by the staff when performing safety evaluations of license applications submitted by applicants pursuant to 10 CFR 50 or 10 CFR 52.<sup>75</sup> Except in those cases in which the applicant proposes an acceptable alternate method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

The provisions of this SRP section apply to reviews of applications docketed six months or more after the date of issuance of this SRP section.<sup>76</sup>

Implementation schedules for conformance to parts of the method discussed herein are contained in the referenced regulatory guides.

VI. REFERENCES<sup>77</sup>

21. 10 CFR Part 50, 50.55a, "Codes and Standards."
12. 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Plants-," General Design Criterion 1, "Quality Standards and Records."<sup>78</sup>
3. Regulatory Guide 1.31, "Control of Ferrite Content in Stainless Steel Weld Metal."
4. Regulatory Guide 1.44, "Control of the Use of Sensitized Stainless Steel."
5. Regulatory Guide 1.85, "~~Code Case Acceptability, ASME Section III Materials.~~"<sup>79</sup> "Materials Code Case Acceptability ASME Section III Division 1."
6. ~~ASME Boiler and Pressure Vessel Code, Section II, Parts A, B, and C, Section III, and Section IX, American Society of Mechanical Engineers.~~ ASME Boiler and Pressure Vessel Code, Section II, "Materials," Parts A, B, and C; Section III, "Rules for Construction of Nuclear Plant Components," Division 1; and Section IX, "Welding and Brazing Qualifications"; American Society of Mechanical Engineers.<sup>80</sup>
7. ~~SRP Section 5.2.3, "Reactor Coolant Pressure Boundary Materials."~~<sup>81</sup>

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**SRP Draft Section 4.5.2**  
Attachment A - Proposed Changes in Order of Occurrence

Item numbers in the following table correspond to superscript numbers in the redline/strikeout copy of the draft SRP section.

Item	Source	Description
1.	Current PRB names and abbreviations.	Editorial change made to reflect the current PRB name and abbreviation for SRP Section 4.5.2.
2.	Editorial.	The acronym SSCs is used in place of structures, systems, and components.
3.	Editorial	Revised to improve grammar and to clarify that non-structural internals are covered as indicated in the next sentence by use of the term "components."
4.	Editorial	Relocated this sentence from subsection I.1 and revised to clearly reflect the scope of components and structures reviewed under this SRP section and not only the components and structures whose material specifications are reviewed.
5.	Current PRB names and abbreviations.	Editorial change made to reflect the current PRB abbreviation established previously for this SRP section.
6.	Editorial	Revised to improve grammar.
7.	SRP-UDP format item	Relocated this stated review interface to the Review Interfaces subsection of Areas of Review.
8.	Editorial	Revised to eliminate a misleading adjective. Based upon the next sentence (in Rev. 2) in this paragraph, the Areas of Review do not appear intended to cover only "major" components. Also revised to reflect that included components are described previously.
9.	Editorial	Relocated this information such that it precedes subsection I.1 to clearly establish the scope of components reviewed under this SRP section, not only the components whose material specifications are reviewed.
10.	Editorial	Revised to clarify that welding controls for reactor internals (not necessarily limited to "controls on welding of materials used") are reviewed. Also revised to clarify that welding controls for core support structures are also reviewed.

**SRP Draft Section 4.5.2**  
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
11.	Editorial	Revised to clarify that non-destructive examination of product forms other than tubular products is also reviewed. Reactor internals and core support structures are typically constructed of a variety of product forms in addition to tubular products. The ASME Code Articles (NG-2500 and NG-5300) cited as specific acceptance criteria related to this Area of Review in subsection II.3 cover the examination of numerous product forms in addition to tubular products.
12.	Editorial	Removed plural to improve grammar.
13.	Editorial	Added plural and associated verb-form to improve grammar/clarity.
14.	Editorial	Revised to improve grammar and to clarify that non-structural internals are covered.
15.	Editorial	In response to a PRB comment on the draft revision of SRP Section 5.2.3, added clarification that stabilized stainless steels may also be used as materials.
16.	Editorial	Since the preceding paragraph was revised to discuss both stabilized and unstabilized stainless steels, replaced "these" with "unstabilized" to retain the original intent to discuss the susceptibility of unstabilized steels to stress corrosion.
17.	SRP-UDP format item, Reformat Areas of Review	Added Review Interface subsection of Areas of Review using numbered paragraphs to be consistent with SRP-UDP required format so that reviews performed in other SRP Sections which are relevant to the overall review of reactor internals and core support structures materials are detailed in their own subsection. Also reformatted existing description of review interfaces in numbered format.
18.	SRP-UDP Integration of Bolting Issues, Potential Impacts 1000 and 1820	Added a review interface reflecting reviews of bolting and threaded fastener programs under new SRP Section 3.13.
19.	Editorial, SRP-UDP format item	Relocated the review interface previously stated in subsection I, 2nd paragraph. Also revised to reflect which materials are reviewed and to eliminate identification of the PRB in the stated interface.
20.	<b>Integrated Impact 440</b> , Potential Impact 23286	Added Review Interfaces reflecting review of reactor coolant chemistry specifications and controls (separately for BWRs and PWRs) as they relate to determining compatibility with materials to be exposed to reactor coolant and determining that the potential for structure/component stress corrosion cracking will be minimized.

**SRP Draft Section 4.5.2**  
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
21.	SRP-UDP format item	Added standard SRP-UDP introduction for review interfaces with other PRBs.
22.	Potential Impacts 23285 and 25592	Added an interface which addresses review of the adequacy of reactor internals material fatigue properties and the possible loss of fatigue resistance with age under the environmental conditions of reactor service.
23.	Potential Impacts 25354 and 25355	Added a Review Interface which reflects SRP Section 3.9.5 reviews of compliance with regulatory requirements (e.g., GDCs 4 and 10) related to review of materials for reactor internals and core support structures.
24.	Potential Impact 23282	Added a Review Interface to reflect reviews of material selection as it relates to ALARA objectives.
25.	SRP-UDP format item	Added standard SRP-UDP discussion of the criteria and reviews detailed in other SRP Sections.
26.	Editorial	Added plurals to improve grammar/clarity and consistency with the content of the remainder of this SRP section. It should be noted that multiple internals/structures are reviewed and that several safety functions related to reactor internals and core support structures are identified in the Technical Rationale.
27.	Editorial	Revised for consistency with terminology used in this SRP section.
28.	SRP-UDP format item	Added identification by reference number for the first citation of the Code per SRP-UDP format.
29.	Reference verification	Added reference to Division 1 to reflect that cited Articles are located in Section III, Division 1 of the Code in the 1989 edition.
30.	Editorial, SRP-UDP format item- Reformat reference citations	Revised to improve clarity. Also deleted obsolete title for Regulatory Guide 1.85 since current titles of Regulatory Guides are provided in subsection VI, References.
31.	Reference verification	Added reference to Division 1 to reflect that cited Articles are located in Section III, Division 1 of the Code in the 1989 edition.
32.	Editorial, Reference verification	Reworded the paragraph to improve statement of the information as criteria and to clarify that not only component welds are covered by the criteria.

**SRP Draft Section 4.5.2**  
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
33.	Editorial	Revised to clarify that criteria for non-destructive examination of product forms other than tubular products is also provided. Reactor internals and core support structures are typically constructed of a variety of product forms in addition to tubular products. The ASME Code Articles (NG-2500 and NG-5300) cited as specific acceptance criteria cover the examination of numerous product forms in addition to tubular products.
34.	Editorial	Added punctuation for clarity/correctness.
35.	Reference verification	Added reference to Division 1 to reflect that cited Articles are located in Section III, Division 1 of the Code in the 1989 edition.
36.	Editorial	Added punctuation for clarity/correctness.
37.	Reference verification	Added reference to Division 1 to reflect that cited Articles are located in Section III, Division 1 of the Code in the 1989 edition.
38.	<b>Integrated Impacts 440 and 1305</b>	Added specific reference to the subsections of SRP Section 5.2.3 where the applicable criteria is described and where ROCs 805 and 846 with similar recommendations to the above integrated impacts have been processed in the draft revision for SRP Section 5.2.3. Also deleted the title for SRP Section 5.2.3 since it is previously identified in subsection I.4.
39.	SRP-UDP format item-Reformat reference citations	Deleted title for Regulatory Guide 1.44 since current titles of Regulatory Guides are provided in subsection VI, References.
40.	SRP-UDP format item-Reformat reference citations	Deleted title for Regulatory Guide 1.31 since current titles of Regulatory Guides are provided in subsection VI, References.
41.	Editorial	Revised to clarify that compatibility for core support structure materials are also subject to the stated criteria and to use terminology consistent with the remainder of the SRP section.
42.	Reference verification	Added reference to Division 1 to reflect that cited Articles are located in Section III, Division 1 of the Code in the 1989 edition.
43.	NRC Metrication Policy implementation	Added the SI equivalent of 1050-1100 degrees F and reformatted in SI units consistent with NRC metrication policy. See attached Metrication Documentation.
44.	NRC Metrication Policy implementation	Added the SI equivalent of 1050 degrees F and reformatted in SI units consistent with NRC metrication policy. See attached Metrication Documentation.

**SRP Draft Section 4.5.2**  
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
45.	SRP-UDP format item	Technical Rationale were developed and added for the following Acceptance Criteria: GDC 1 and 10 CFR 50.55a. The SRP-UDP program requires that Technical Rationale be developed for the Acceptance Criteria.
46.	Editorial	Added plural and modified verb to improve grammar/correctness noting that several procedures are subsequently presented.
47.	Editorial	Revised to clarify that not only component materials are reviewed.
48.	Editorial	Revised to clarify that specifications for core support structure materials are also reviewed/verified. Also revised to cover selection of materials based upon acceptable Code Cases, consistent with the corresponding specific acceptance criteria in subsection II.1.
49.	Editorial	Revised the sentence to improve clarity and to explicitly reflect that welding of core support structures is reviewed.
50.	Reference verification	Added reference to Division 1 to reflect that cited Articles are located in Section III, Division 1 of the Code in the 1989 edition.
51.	Editorial	Revised the sentence to improve the clarity of the procedure for review of welding controls. Added "also" to reflect the SRP Section 5.2.3 welding controls are in addition to those of NG-4000. Also deleted unnecessary punctuation.
52.	Editorial	Added plurals to reflect that several processes or controls may be evaluated as described.
53.	Editorial	Revised to clarify that the procedures are also applicable to non-destructive examination of product forms other than tubular products. Reactor internals and core support structures are typically constructed of a variety of product forms in addition to tubular products. The ASME Code Articles (NG-2500 and NG-5300) cited as specific acceptance criteria in subsection II.3 cover the examination of numerous product forms in addition to tubular products.
54.	Reference verification	Added reference to Division 1 to reflect that cited Articles are located in Section III, Division 1 of the Code in the 1989 edition.
55.	Editorial	Substituted "described" for "spelled out" and "include" for "follow" for consistency with terminology typically used throughout the SRP to characterize the role of a cited information source.

**SRP Draft Section 4.5.2**  
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
56.	Editorial, Reference verification	Revised to reflect inclusion of SRP Section 5.2.3 areas of review and review procedures as part of the review rather than a representation that they comprise the entire review. Also deleted title for SRP Section 5.2.3 since the title is provided earlier in subsection I.4.
57.	<b>Integrated Impact 1305</b> , Reference Verification	Added reference to a method identified as a previously accepted alternative to the weld qualification/non-sensitization verification guidance of RG 1.44, in SRP Section 4.5.1.
58.	<b>Integrated Impact 438</b>	Added Review Procedures for review of nickel-chromium-iron alloys proposed as reactor internals materials.
59.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard paragraph to address application of Review Procedures in design certification reviews.
60.	Editorial	Revised to eliminate use of a gender specific pronoun.
61.	Editorial	Added plurals to make terminology consistent with the rest of this SRP section.
62.	Editorial	Revised to eliminate restatement of the finding as a basis for the finding.
63.	Editorial	Added plurals to make terminology consistent with the rest of this SRP section.
64.	Editorial	Revised to improve grammar/clarity.
65.	Reference verification	Revised to characterize the content of RGs 1.31 and 1.44 as positions, rather than recommendations, consistent with terminology used in RGs.
66.	<b>Integrated Impacts 436, 437, and 443</b>	Added finding to address references to SRP Section 5.2.3 for criteria, procedures, etc. related to review of austenitic stainless steel. ROCs 799, 800, and 807 addressing issues similar to the above integrated impacts have been incorporated in the SRP-UDP draft revision of SRP Section 5.2.3.
67.	Editorial	Added plurals to make terminology consistent with the rest of this SRP section. Also struck "components of" to reflect that the finding applies to the internals and core support structures, not just their components.
68.	Reference verification	Added reference to Division 1 to reflect that cited Articles are located in Section III, Division 1 of the Code in the 1989 edition.

**SRP Draft Section 4.5.2**  
Attachment A - Proposed Changes in Order of Occurrence

Item	Source	Description
69.	Editorial	Revised to clarify that 1) certain typically used materials are not addressed by the ASME Code, 2) Regulatory Guide 1.85 identifies acceptable material selection alternatives to those of the ASME Code but does not constitute additional criteria which all materials must satisfy, and 3) acceptance may also be based upon demonstrated adequacy of the material.
70.	Editorial	Added plurals to make terminology consistent with the rest of this SRP section.
71.	Editorial, SRP-UDP format item	Revised to improve sentence intelligibility and added plurals to improve grammar.
72.	Editorial	Added plurals for "regulatory guides" since three regulatory guides are discussed in this subsection.
73.	Editorial	Relocated the final sentence as a separate paragraph to reflect a conclusion which follows from several preceding paragraphs (not just the last paragraph) and revised to discuss the "relevant requirements" of the cited regulations.
74.	SRP-UDP Format Item, implementation of 10 CFR 52	Provided standard change to Evaluation Findings to address design certification reviews.
75.	SRP-UDP Guidance, Implementation of 10 CFR 52	Added standard sentence to address application of the SRP section to reviews of applications filed under 10 CFR Part 52, as well as Part 50.
76.	SRP-UDP Guidance	Added standard paragraph to indicate applicability of this section to reviews of future applications.
77.	SRP-UDP format item, Editorial	Renumbered and reordered listing of references in accordance with SRP-UDP format guidance.
78.	SRP-UDP format item, Reference verification	Added current title and identification of GDC 1 since GDC 1 is cited in subsection II.
79.	Reference Verification, Editorial	Updated to reflect current title of RG 1.85.
80.	SRP-UDP format item, Reference verification, Editorial	Revised reference listing to reflect titles of major Code sections cited in the SRP section and the organization of the 1989 edition.
81.	SRP-UDP format item	Deleted reference listings for other SRP Sections since they are a part of NUREG-0800 along with SRP Section 4.5.2.

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**SRP Draft Section 4.5.2**  
Attachment B - Cross Reference of Integrated Impacts

Integrated Impact No.	Issue	SRP Subsections Affected
436	Revise the SRP to address staff positions, based upon NUREG-0313, Rev. 2 and Generic Letter 88-01, which are more restrictive than RG 1.44.	Evaluation Findings, subsection IV.
437	Revise the SRP to address staff positions for stainless steel weld metal which are more restrictive than RG 1.31.	Evaluation Findings, subsection IV.
438	Add Review Procedures for review of the acceptability of nickel-chromium-iron alloys as control rod drive materials.	Review Procedures subsection III.5.
439	Revise the SRP to address staff positions supplementing EPRI Evolutionary Plant Utilities Requirements Document (URD) requirements for control of impurities/contaminants to which NSSS materials could be exposed.	No changes in this proposed draft revision.
440	Revise the SRP to address staff positions related to avoiding IGSCC in BWR austenitic stainless steel materials, based upon NUREG-0313, Rev. 2 and Generic Letter 88-01.	Areas of Review, subsection I EMCB Review Interface 2 and Acceptance Criteria, subsection II.4.
441	Revise the SRP to cite ANSI/ASME NQA-2 in and RG 1.37 for cleanliness controls. Also consider revising RG 1.37 to cite ANSI/ASME NQA-2.	No changes in this proposed draft revision.
442	Evaluate the latest versions of AWS A4.2 and AWS A5.4 for regulatory endorsement (in RG 1.31).	No changes in this proposed draft revision.
443	Revise the SRP to address staff positions related to abrasive work (e.g. grinding) on austenitic stainless steel which are more restrictive than RG 1.37.	Evaluation Findings, subsection IV.
444	Evaluate the latest version of ASTM A-262 for regulatory endorsement (in RG 1.44).	No changes in this proposed draft revision.
1305	Revise the SRP to address alternatives to RG 1.44 guidance to use ASTM A-262 Practices A or E for verification of nonsensitization.	Acceptance Criteria, subsection II.4 and Review Procedures, subsection III.4.
1328	Revise RG 1.70 to cite ASME B&PVC NG-2000 for materials for reactor internals.	No changes in this proposed draft revision.